UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

May 17, 2001

Mark G. Miller
Supervisor, U.S. Fish and Wildlife Service
Eastern Washington Ecological Services Sub-Office
P.O. Box 848
Ephrata, Washington 98823

Re: Biological Opinion for the Goat Creek Meander Channel Restoration Project
(NMFS No. WSB-99-087)

Dear Mr. Miller:

The attached document transmits the National Marine Fisheries Service's (NMFS) Biological Opinion (BO) on the proposed Goat Creek Meander Channel Restoration Project in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The U.S. Fish and Wildlife Service had determined that the proposed actions are likely to adversely affect the Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) and UCR spring chinook salmon (*O. tshawytscha*) Evolutionarily Significant Units (ESU). Formal consultation was initiated for this project on February 5, 2001.

This BO reflects formal consultation and an analysis of effects covering the UCR steelhead and UCR spring chinook salmon in Goat Creek, Okanogan County, Washington. The BO is based on information provided in the biological assessment (BA) sent to NMFS by the U.S. Fish and Wildlife Service on April 14, 1999, and subsequent additional information transmitted via a site visit, by facsimiles, telephone conversations, and e-mail. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

The NMFS concludes that implementation of the proposed projects is not likely to jeopardize the continued existence of UCR steelhead or UCR spring chinook salmon or result in the destruction or adverse modification of their critical habitat. In your view, please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take.

If you have any questions, please contact Dennis Carlson of the Washington State Habitat Branch Office at (360) 753-5828.

Sincerely,

Michael R. Crouse

Donna Darm
Acting Regional Administrator

Enclosure

ENDANGERED SPECIES ACT - SECTION 7
AND ESSENTIAL FISH HABITAT

BIOLOGICAL OPINION

Goat Creek Meander Reconstruction Project in the Methow River Basin
WSB-99-087

Agency: U.S. Fish and Wildlife Service

Consultation
Conducted By: National Marine Fisheries Service
Northwest Region
Washington State Habitat Branch

Approved Michael R. Crouse Date May 17, 2001
Donna Darm
Acting Regional Administrator

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I. BACKGROUND AND DESCRIPTION OF THE PROPOSED PROJECT

A. Background

On April 14, 1999, the National Marine Fisheries Service (NMFS) received a Biological Assessment (BA) and request for section 7 consultation from the U.S. Fish and Wildlife Service (USFWS). The BA described a proposal to re-establish meanders, in-stream habitat, and restore riparian habitat at Goat Creek, a tributary to the Methow River at approximately river mile (RM) 60, near Mazama, Okanogan County, Washington.

Subsequently, additional information necessary to complete the consultation was provided to NMFS on January 29, 2001. The Bonneville Power Administration and the USFWS will provide funding and project planning/implementation, respectively, for the action, thus creating a federal nexus and the need for section 7 consultation. The USFWS is acting as the lead agency in this consultation.

The USFWS has determined that the proposed action will occur within the evolutionarily significant unit (ESU) and critical habitat of endangered Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) and endangered UCR spring chinook salmon (*O. tshawytscha*). The USFWS determined that the proposed actions were likely to adversely affect both UCR steelhead and spring chinook salmon.

This BO reflects the results of the formal consultation process. Formal consultation involves correspondence and communication between NMFS and the lead action agency to supplement and clarify the information contained within the BA. A summary of key events is provided below.

- Receipt of the BA and engineering design plans from USFWS on April 14, 1999.
- Site visit with the USFWS and U.S. Forest Service on August 31, 2000.
- USFWS submission of additional project information on February 5, 2001.

In addition to the above, numerous phone conversations have occurred between NMFS and members of the action agencies.

The objective of this BO is to determine whether the proposed project is likely to jeopardize the continued existence of UCR steelhead and UCR spring chinook salmon, or result in the destruction or adverse modification of their designated critical habitat.

B. Description of the Proposed Action

The USFWS has proposed construction activities to re-establish meanders and in-stream habitat on approximately 4,800 linear feet of Goat Creek, extending from its confluence with the Methow River upstream. Project work would entail using root wad revetments, planting benches, constructing j-hook, cross, and straight vanes in and adjacent to the flow channel. Nine cross vanes would be installed for

grade control and sediment control. The floodplain will be re-established including revegetation using native species. The creek bed was channelized and leveed on both sides in the late 1970s, virtually removing all habitat attributes.

In-stream habitat improvements would include the creation of a scour pool immediately downstream from each constructed cross vane. An additional eight pools would be created on the outside bend of the new meander to mimic natural pool conditions found in Goat Creek. Large woody debris and vegetation would be used to provide cover habitat for fish in the pools. Additional large woody debris, boulders, and riparian vegetation would be used to provide refugia, feeding, and resting areas within the project area.

Riparian restoration would entail replanting native species in the restored floodplain within the leveed area at the project's conclusion, or during next spring if snow falls early.

Project construction would be conducted in the dry whenever possible, and is expected to take from six to eight weeks to complete. Because of the low snowpack conditions present in the Methow basin this year (approximately 50% of normal), the USFWS anticipates that most, if not all work would be conducted in the dry starting in August and extending through September, 2001. If flows are present a bypass would be constructed around the work area to reduce sediment introduction. Additional timing guidelines and work conditions will be set forth by the Washington Department of Fish and Wildlife in their Hydraulic Permit Approval.

The proposed project incorporates several conservation measures (i.e., use of straw bales, sediment screens, snorkel surveys, spawning surveys, avoidance of work if listed fish are in the work area, etc.) into its design to avoid or minimize construction impacts to the federally listed species under review. These are described within the BA, project addendums, or have been agreed upon in the consultation process. In conducting the analysis presented in this BO, NMFS assumes that these measures will be implemented in the project design, staging, construction, and operation.

1. Structure Descriptions

Cross vanes are low cross channel structures which are composed of a rock toe and a top row of boulders. They are keyed into the streambank at an elevation no higher than the bankfull elevation and sloped toward the bottom of the channel with a gradient between 3 to 7% (USFWS BA, 1999). This prevents undermining and stream channel migration around the structure while not inhibiting the natural function of the floodplain or fish passage (Rosgen 1998). Cross vanes are designed for gradient control and improve habitat by creating scour pools with clean gravels in the tailouts, turbulent water cover, holding areas and interstitial spaces for juvenile salmonids and benthic organisms (USFWS BA, 1999).

J-hook and straight vanes are low profile structures which are comprised of a rock toe and a top row of boulders. They are keyed in to the streambank at an elevation no higher than the bankfull elevation and sloped toward the bottom of the channel with a gradient between 3 to 7% (USFWS BA, 1999). This prevents migration around the structure while not inhibiting the natural function of the floodplain (Rosgen 1998). Vanes are designed to improve habitat by creating scour pools with clean gravels in

the tailouts, turbulent water cover, holding areas and interstitial spaces for juvenile salmonids and benthic organisms (USFWS BA 1999).

Rootwad revetments are rootwads which are keyed into the streambank at an elevation no higher than the bankfull elevation and anchored with boulders and a footer log (Rosgen 1996, The Federal Interagency Stream Restoration Working Group: FISRWG 1998). The extended rootwads provide small pool habitat, clean gravels in the tailouts, high flow refugia, overhead cover, shade, detritus, and aquatic insect habitat (USFWS BA, 1999). These structures provide a collection point for large woody debris floating down the river thus creating a log jam that promotes the natural function of the floodplain. Rootwad revetments provide habitat diversity in systems that have been altered by channelization and also aid in reducing the rate of erosion where the removal of large woody debris and poor land use practices have occurred. Rootwad revetments are used in systems where conventional large woody debris installation is not feasible due to the size and the condition of the river.

2. Riparian Restoration

Most of the riparian vegetation along this reach of Goat Creek had been removed by channelization work conducted in the 1970s. A floodplain would be re-established within the leveed area and revegetated with native riparian plant species beneficial to fish and wildlife, such as ponderosa pine (*Pinus ponderosa*), black cottonwood (*Populus trichocarpa*), quaking aspen (*Populus tremuloides*), Sitka alder (*Alnus crispa*), red-osier dogwood (*Cornus stolonifera*), and several willow species (*Salix spp*.). These plants would provide shade, future large woody debris recruitment, overhang cover, leaf litter and other detritus in support of the aquatic food chain development in the project area.

3. Action Area

Under the ESA, the "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." 50 C.F.R. § 402.02. The action area for this consultation is Goat Creek, starting near RM1, proceeding downstream to the confluence with the Methow River and possibly extending some distance down the Methow River from its confluence with Goat Creek. The precise downstream limit of the action area cannot be easily determined because of the extent of indirect effects of the proposed action on the Methow River would depend whether or not there is surface flow when the project work is conducted.

II. STATUS OF THE SPECIES AND CRITICAL HABITAT

A. UCR Steelhead

UCR steelhead were listed as endangered species under the ESA on August 18, 1997 (62 Fed. Reg. 43937). Critical habitat for the UCR steelhead was designated on February 16, 2000 (65 Fed. Reg. 7764; February 16, 2000). The listing status, biological information, and other information for the UCR steelhead is further described in Attachment 1.

Range-wide factors for the decline of west coast steelhead stocks are primarily attributed to the destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors (NMFS 1996a, 1996b, 1997). Forestry, agriculture, mining, and urbanization have degraded, simplified, and fragmented habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes (including the Columbia River Basin) have greatly reduced or eliminated historically accessible habitat. Studies estimate that during the last 200 years, the lower 48 states have lost approximately 53% of all wetlands and the majority of the rest are severely degraded (Gregory & Bisson 1997). Washington and Oregon's wetlands are estimated to have diminished by one-third, while California has experienced a 91% loss of its wetland habitat (NRC 1996).

Loss of habitat complexity has also contributed to the range-wide decline of steelhead. In portions of some national forests in Washington, there has been a 58% reduction in large deep pools due to sedimentation and loss of pool-forming structures such as boulders and large wood (McIntosh et al. 1994). Sedimentation from land use activities is recognized as a primary cause of habitat degradation in the range of west coast steelhead (62 Fed. Reg. 43942).

Steelhead of this list ESU that are likely to be adversely affected by the proposed action are present in Goat Creek, a tributary to the Methow River. The UCR Basin steelhead ESU occupies the Columbia River Basin upstream from the confluence with the Yakima River, Washington, to the United States-Canada border. The geographic area occupied by this ESU forms part of the larger Columbia Basin Ecoregion (Omernik 1987). Goat Creek is in the Okanogan Highlands Physiographic Province. The river valleys in this region are deeply dissected and maintain low gradients except in extreme headwaters. The climate in this area includes extremes in temperatures and precipitation, with most precipitation falling in the mountains as snow. Streamflow in this area is provided by melting snowpack, groundwater, and runoff from alpine glaciers.

The proposed action would occur within designated critical habitat for UCR steelhead. Defining specific river reaches that are critical for steelhead is difficult because of the low abundance of the species and of our imperfect understanding of the species' freshwater distribution, both current and historical (65 Fed. Reg. 7764; February 16, 2000). Based on consideration of the best available information regarding the species' current distribution, NMFS believes that the preferred approach to identifying critical habitat for steelhead is to designate all areas accessible to the species within the range of specified river basins in this ESU (65 Fed. Reg. 7764; February 16, 2000).

Essential features of steelhead critical habitat include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions. Good summaries of the environmental parameters and freshwater factors that have contributed to the decline of steelhead can be found in reviews by Barnhart (1986); Pauley *et al*., (1986); California Advisory Committee on Salmon and Steelhead Trout (CACSST) (1988); Brown and Moyle (1991); Bjornn and Reiser (1991); Higgins *et al*., (1992); Nehlsen *et al*., (1991); California State Lands Commission (1993); Reynolds *et al*., (1993); Botkin *et al*., (1995); McEwan and Jackson (1996); NMFS (1996); NMFS (1996a, 1996b, 1997); and Spence *et al*., (1996).

Estimates of historical (pre-1960s) steelhead abundance specific to this ESU are available from fish counts at dams. Counts at Rock island Dam from 1933 to 1959 averaged 2,600 to 3,700, suggesting a pre-fishery run size in excess of 5,000 adults for tributaries above Rock Island Dam (Chapman *et al*., 1994). Recent five-year (1989-1993) average natural escapements for the Methow and Okanogan rivers was 450 steelhead. Recent average total escapements for this stock was 2,400 (62 Fed. Reg. 43949; August 18, 1997).

Steelhead in the Upper Columbia River ESU continue to exhibit low abundances, both in absolute numbers and in relation to numbers of hatchery fish throughout the region. Review of the most recent data indicates that natural steelhead abundance has declined or remained low and relatively constant in the major river basins in this ESU (Wenatchee, Methow, Okanogan) since the early 1990s (NMFS 1996a, 1996b, 1997). Estimates of natural production of steelhead in the ESU are well below replacement (approximately 0.3:1 adult replacement ratios estimated in the Wenatchee and Entiat rivers) (62 Fed. Reg. 43949; August 18, 1997). These data indicate that natural steelhead populations in the Upper Columbia River Basin are not self-sustaining at the present time. There is also anecdotal evidence that resident rainbow trout contribute to anadromous run abundance. This phenomenon would reduce estimates of the natural steelhead replacement ratio (62 Fed. Reg. 43949; August 18, 1997).

The primary cause for concern for steelhead in this ESU is the extremely low estimate of adult replacement rate. The dramatic declines in natural run sizes and inability of naturally spawning steelhead adults to replace themselves suggest that if present trends continue, this ESU will not be viable (62 Fed. Reg. 43950, August 18, 1997).

Steelhead may spawn and rear in Goat Creek. Steelhead juveniles range in the lower reach of Goat Creek, including the proposed project area. However, neither steelhead spawning or steelhead redds have been observed in Goat Creek (personal communication with Jennifer Molesworth, U.S. Forest Service, March 21, 2001). Juvenile steelhead may migrate from the Methow River into Goat Creek seeking suitable rearing habitat. Also, a rainbow trout[1] population at the headwaters was genetically

[1]Under certain conditions, anadromous and resident *O. mykiss* are apparently capable not only of interbreeding, but also of having offspring that express the alternate life history form, that is, anadromous fish can produce nonanadromous offspring, and vice versa (NMFS 1996a). Mullan *et al*. (1992) found evidence that, in very cold streams, juvenile steelhead had difficulty attaining "mean threshold size for smoltification" and concluded that "Most fish here (Methow River, Washington) that do not emigrate downstream early in life are thermally-fated to a resident life history regardless of whether they were the progeny of anadromous or resident parents."

tested and found to be "essentially pure" interior redband rainbow trout[2] (USFS 2000e). At RM 12.0 there is a natural falls that is a barrier to upstream fish passage (Andonaegui 2000).

NMFS believes that resident fish can help buffer extinction risks to an anadromous population by mitigating depensatory effects in spawning populations, by providing offspring that migrate to the ocean and enter the breeding population of steelhead, and by providing a "reserve" gene pool in freshwater that may persist through times of unfavorable conditions for anadromous fish. A particular concern is isolation of resident of resident populations by human-caused barriers to migration. This interrupts normal population dynamics and population genetic processes and can lead to loss of a genetically based trait (anadromy).

B. UCR Spring Chinook

The UCR spring chinook salmon ESU was listed as endangered pursuant to the ESA on March 24, 1999 (64 Fed. Reg. 14308). Critical habitat for the UCR spring chinook salmon was designated on February 16, 2000 (65 Fed. Reg. 7764). The listing status, biological information, and other information for the UCR spring chinook salmon are further described in Attachment 2.

The species status reviews (NMFS 1998a, 1998b) cited references indicating that habitat degradation is the major cause for the range-wide decline in west coast chinook salmon stocks. Habitat alterations that have affected chinook salmon include water withdrawal, conveyance, storage, flood control (resulting in insufficient flows, stranding, juvenile entrainment, and increased stream temperatures), logging and agriculture (resulting in loss of large woody debris, sedimentation, loss of riparian vegetation, and habitat simplification) Spence *et al.*, 1996; NMFS 1998a). Dams, mining and urbanization have also contributed to the partial depletion or extinction of certain chinook salmon stocks.

Other range-wide factors that impact indigenous west coast chinook salmon stocks include introduced or artificially propagated hatchery stock, commercial harvest, alteration of estuarine habitat, and natural fluctuations in marine environments (Healy 1991, NMFS 1998a, 1998b).

Spring chinook salmon of this listed ESU that may be adversely affected by the proposed action spawn in the Methow River above and below the confluence with Goat Creek and probably rear in the mouth of Goat Creek (Andonaegui 2000).The UCR spring chinook salmon ESU occupies the Columbia River Basin upstream from Rock Island Dam to the United States - Canada border. The geographic area occupied by this ESU forms part of the larger Columbia Basin Ecoregion (Omernik 1987). Goat Creek is located in the Okanogan Highlands Physiographic Province, and includes

[2]While there is currently no conclusive evidence regarding the relationship of resident and anadromous *O. mykiss*, NMFS believes available evidence suggests that resident rainbow trout should be included in listed steelhead ESUs in certain cases. Such cases include (1) where *O. mykiss* have the opportunity to interbreed with anadromous fish, and (2) where resident fish of native lineage once had the ability to interbreed with anadromous fish but no longer do because of human-made barriers.

stream-type chinook salmon that spawn upstream of the Rock Island Dam in the Wenatchee, Entiat, and Methow Rivers and their tributaries. The climate in this area includes extremes in temperatures and precipitation, with most precipitation falling in the mountains as snow. Streamflow in this area is provided by melting snowpack, groundwater, and runoff from alpine glaciers.

The proposed action would occur within designated critical habitat for the UCR spring chinook salmon. Defining specific river reaches that are critical for spring chinook salmon is difficult because of the current low abundance of the species and of our imperfect understanding of the species' freshwater distribution, both current and historical (65 Fed. Reg. 7764; February 16, 2000).

The NMFS' preferred approach to identifying the freshwater and estuarine portion of critical habitat is to designate all areas (and their adjacent riparian zones) accessible to the species within the range of each ESU (65 Fed. Reg. 7764; February 16, 2000). NMFS believes that adopting a more inclusive, watershed-based description of critical habitat is appropriate because it (1) recognizes the species' use of diverse habitats and underscores the need to account for all of the habitat types supporting the species' freshwater and estuarine life stages, from small headwater streams to migration corridors and estuarine rearing areas; (2) takes into account the natural variability in habitat use (e.g., some streams may have fish present only in years with plentiful rainfall) that makes precise mapping difficult; and (3) reinforces the important linkage between aquatic areas and adjacent riparian/upslope areas (65 Fed. Reg. 7764; February 16, 2000).

Essential features of spring chinook salmon critical habitat include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space and safe passage conditions. Good summaries of these environmental parameters and freshwater factors that have contributed to the decline of spring chinook salmon and other salmonids can be found in reviews by CACSS, 1988; Brown and Moyle, 1991; Bjornn and Reiser, 1991; Nehlsen *et al*., 1991; Higgins *et al*., 1992; California State Lands Commission (CSLC), 1993; Botkin *et al*., 1995 NMFS, 1996; NMFS 1998a and 1998b; and Spence *et al*., 1996.

UCR spring chinook have had a substantial portion of historical habitat blocked by Chief Joseph and Grand Coulee Dams on the mainstem Columbia River NMFS 1998a, 1998b). There are local habitat problems related to irrigation diversions and hydroelectric development, as well as degraded riparian and instream habitat from urbanization and livestock grazing (65 Fed. Reg. 7764; February 16, 2000).

Previous assessments of stocks within this ESU have identified several as being at risk or of concern. Nehlsen *et al*., (1991) identified six stocks as extinct. Washington Department of Fisheries *et* al., (1993) considered nine stocks within the ESU, of which eight were considered to be of native origin and predominantly natural production. The status of all nine stocks was considered depressed. Populations in this ESU have experienced record low returns for the last few years (65 Fed. Reg. 7764; February 16, 2000).

Recent total abundance of the UCR spring chinook salmon ESU is quite low, and escapements in 1994-1996 were the lowest in at least 60 years (65 Fed. Reg. 7764, February 16, 2000). At least six populations of spring chinook salmon populations in this ESU have become extirpated and almost all

remaining naturally-spawning populations have fewer than 100 spawners (65 Fed. Reg. 7764, February 16, 2000). In addition to extremely small population sizes, both recent and long-term trends in abundance are downward, some extremely so. The Washington State Salmon and Steelhead Stock Inventory (SASSI, 1992) lists the Methow River spring chinook salmon stock as depressed, based on a long-term negative trend in escapement. Stock performance over the past decade would put them at the head of the "critical" class defined in the SASSI. Spring chinook spawning has been observed in some tributaries including Early Winters, Gold, Lake, and Wolf Creeks.

Because of poor returns of adult spring chinook salmon to the UCR ESU during the last several years, the fish have been captured at the Wells Dam on the Columbia River and have been used to artificially supplement naturally populations in his ESU. However, preliminary indications are that sufficient numbers of adult spring chinook salmon will be returning this year to allow passage of fish to the tributary systems to naturally spawn. If adequate instream flows are available, it is possible that some of those returning fish may attempt to spawn naturally in the Methow River adjacent to the mouth of Goat Creek.

Snorkel surveys performed by the U.S. Forest Service during the summer of 1994 and 2000 showed the presence of both juvenile chinook and steelhead/rainbow trout in lower Goat Creek (personal communication with Jennifer Molesworth, U.S. Forest Service, March 21, 2001). Those findings confirm juvenile chinook salmon use of Goat Creek for rearing habitat.

III. EVALUATING PROPOSED ACTIONS

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 C.F.R. Part 402 (the consulting regulations). The NMFS must determine whether the action is likely to jeopardize the listed and/or whether the action is likely to adversely modify critical habitat. This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' designated critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both the survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the

action will adversely modify critical habitat, it must identify any reasonable and prudent measures available.

Guidance for making determinations of jeopardy and adverse modification of habitat are contained in *The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, August 1999.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. The NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration and spawning of the listed salmon under the existing environmental baseline.

A. Biological Requirements

The first step in the methods NMFS uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. The NMFS also considers the current status of the listed species; taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NMFS starts with the determinations made in its original decision to list the species for protection under the ESA. Additionally, the assessment will consider any new information or data that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which time, protection under the ESA would be unnecessary. Species or ESUs not requiring ESA protection have the following attributes: population sizes large enough to maintain genetic diversity and heterogeneity, the ability to adapt to and survive environmental variation, and are self-sustaining in the natural environment.

The biological requirements for both UCR steelhead and spring chinook include food (energy) source, flow regime, water quality, habitat structure, passage conditions (migratory access to and from potential spawning and rearing areas), and biotic interactions (Spence, et al., 1996).

The NMFS has related the biological requirements for listed salmonids to a number of habitat attributes, or pathways, in the Matrix of Pathways and Indicators (MPI). These pathways (Water Quality, Habitat Access, Habitat Elements, Channel Condition and Dynamics, Flow/Hydrology, Watershed Conditions, Disturbance History, and Riparian reserves) indirectly measure the baseline biological health of listed salmon populations through the health of their habitat. Specifically, each pathway is made up of a series of individual indicators (e.g. indicators for Water Quality include Temperature, Sediment, and Chemical Contamination) that are measured or described directly (see NMFS 1996). Based on measurement or description, each indicator is classified within a category of the properly functioning condition (PFC) framework: (1) properly functioning, (2) at risk, or (3) not properly functioning. Properly functioning condition is defined as "the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation."

B. Factors Affecting the Species in the Action Area

Section 4(a)(1) of the ESA and NMFS listing regulations (50 C.F.R. § 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors; (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that would have some level of effects with short-term impacts from the first category and the potential for long-term impacts from the fifth category. The characterization of these effects and a conclusion relating the effects to the continued existence of both UCR steelhead and spring chinook salmon are provided below, in section IV: Analysis of Effects.

The major factors affecting steelhead and spring chinook salmon within the action area include instream flows, riparian habitat and channel conditions and dynamics. The NMFS uses the MPI to analyze and describe the effects of these factors on listed steelhead and spring chinook salmon. As described above, the MPI relates the biological requirements of listed species to a suite of habitat variables. In the MPI analysis presented here, each factor is considered in terms of its effect on relevant pathways and associated indicators (properly functioning, at risk, or not properly functioning).

1. Instream Flows

Goat Creek is a fourth-order creek flowing in a southwesterly direction into the Methow River. It is fed by nine tributaries, a number of unnamed tributaries, and a large number of seeps and springs with no well-defined channel (USFWS BA 1999). Instream flows in Goat Creek are controlled primarily by snowpack and groundwater discharges from the upper watershed. Runoff from springtime snowmelt provides most of the annual peak flows in May and June. Lower Goat Creek typically experiences low flows or dewatering during August and September (USFS 1995a). The extent to which the hydrology of Goat Creek has been altered from its natural potential is unknown. The Goat Creek Watershed Analysis (USFS 1995a) stated that any land management activities that increase bedload deposition on the Goat Creek alluvial fan may increase the duration of time that the lower reach dries up, blocking fish passage and isolating fish populations.

The upper third of the drainage is in a relatively natural condition, with few roads and trails. The lower two thirds have been heavily logged, roaded and grazed (USFS 1995). In 1994, ten percent of the Goat Creek drainage (3,672 acres) was burned in the Whiteface Fire (Andonaegui 2000). There is one irrigation ditch (Foster diversion) at RM 1.2 that diverts about 1.8 cfs (USFS 2000e). That diversion requires a USFS special use permit and will be the subject of a future section 7 consultation. In the 1970s the lower 1.5 miles of Goat Creek were channelized. In the late summer and fall Goat Creek flows subsurface near the mouth.

In the MPI analysis, instream flows fall under the Flow/Hydrology pathway, and Change in Peak/Base

Flow indicator. Currently, for the reasons described above, this indicator is not properly functioning. In this instance, not properly functioning is defined as "pronounced changes in peak flow, base flow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography."

2. Riparian Habitat

The Goat Creek drainage has been intensely managed for timber harvest in the past, including in the riparian areas of Goat Creek up to about RM 10. Much of the sediment from roads and slope failures is being transported through the Goat Creek system into chinook salmon spawning areas in the Methow River (USFS 2000e).

Large road networks are found in heavily harvested areas in the west part of the drainage, in the Whiteface Creek, Roundup Creek, Long Creek and Short Creek subdrainages. Many of these roads are impacting riparian areas in these subdrainages (USFS 2000e).

Many skid roads crossed, paralleled, or trailed directly up some tributaries to Goat Creek. Today, these skid roads are used by livestock to access the riparian zone, thereby suppressing natural vegetation regeneration (USFS 1995e). Cattle grazing is damaging riparian vegetation in some of the tributary drainages to Goat Creek as well (USFS 2000e). Consequently, the potential for normal riparian processes (e.g. shading, bank stabilization and large woody debris [LWD] recruitment) to occur is severely diminished.

In the MPI analysis, the lack of riparian vegetation affects several pathways and indicators. Firstly, the Watershed Conditions pathway and Riparian Reserves indicator is not properly functioning: the riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species. Temperature and Large Woody Debris indicators, from the Water Quality and Habitat Elements pathways, are also at risk due to the lack of riparian function.

3. Channel Conditions and Dynamics

The upper third of Goat Creek has a moderate gradient and flows through a U-shaped valley that begins in high alpine meadows and avalanche paths. The middle six miles of stream flows through a high gradient inner gorge that ends at the Methow Valley floor. This section and tributaries to it have been heavily logged, roaded and grazed. The high gradient channel and larger substrate in Goat Creek flush sediment through the system, depositing it into the Methow River, as evidenced by the amount of turbidity during spring runoff (USFS 2000e). The lower mile of Goat Creek spreads out into a large alluvial fan where the stream gradient deposits large amounts of bedload material.

In the 1930s Crown Point Mine built a road across the stream to access their mining site. That road noticeably changed the Goat Creek stream course (1956 aerial photo interpretation), depositing large quantities of sediment and widening the downstream channel (USFS 2000e). Aerial photography taken in 1992 showed some site recovery but unstable banks remain and would likely become active during high flow events (USFS 1995a; USFS 2000e).

The lower mile and a half of Goat Creek was channelized and leveed on both sides in the 1970s, leaving large cobble deposition with few deep pools, a lack of pool-forming structures such as LWD and large boulders, loss of riparian habitat, and loss of stream sinuosity (USFWS 1999). Channelizing and levee construction protected adjacent private property owners from channel migration and high flow events, but affected fish resources by simplifying and homogenizing littoral habitat, reducing channel complexity, and disconnecting Goat Creek from its floodplain. As a result, the Floodplain Connectivity and Width/Depth Ratio indicators (Channel Condition and Dynamics pathway) are not properly functioning.

C. Environmental Baseline

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action would be added. The term "environmental baseline" means "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process." 50 C.F.R.§ 402.02. The term "action area" means "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." Id.

Critical habitat for both steelhead and spring chinook salmon extends to Goat Creek and to all tributaries where anadromous fish range. Direct effects within the action area extend from Goat Creek at the upstream project boundary (approximately RM 1), and some distance downstream from Goat Creek's confluence with the Methow River. The precise downstream limit of the action area cannot be easily determined, because the extent of effects of the proposed action would vary according to flow stage.

Access to a substantial portion of historical habitat for both steelhead and spring chinook salmon was blocked by the construction of Chief Joseph and Grand Coulee Dams on the maintstem Columbia River. For both the UCR steelhead and spring chinook salmon ESUs, there are also local habitat problems related to irrigation diversions, degraded riparian and instream habitat from urbanization, land conversion to crops and orchards, livestock grazing, and timber harvest (NMFS 1996a, 1996b, 1997, 1998a, 1998b).

Goat Creek is designated Late Successional Reserve[3] and a fourth order tributary to the Methow River. It joins the Methow at RM 64, about one mile downstream from Mazama. The entire drainage, with the exception of some private lands at the mouth, was designated Late-Successional Reserve in 1992. The upper third of the drainage is in relatively natural condition, with few roads and trails. The

[3]Lands designated to maintain and enhance a functional, interactive, late-successional and old-growth forest ecosystem. They are designed to serve as habitat for late-successional and old-growth related species (Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl; April 13, 1994).

lower two thirds have been heavily logged, roaded and grazed (USFS 1995a). The Goat Creek Watershed Analysis was completed by the U.S. Forest Service in 1995. The watershed is managed under the Okanogan Forest Plan as amended by the Northwest Forest Plan. Correcting problems (erosion control, riparian restoration, stream channel restoration) associated with land management activities were identified in the Watershed Analysis for restoring habitat conditions in Goat Creek (USFS 1995a).

Road densities in parts of the Goat Creek watershed are higher than those desired for threatened and endangered fish and wildlife and higher in places than what is recommended in the Okanogan Forest Plan. Watershed roads are deteriorating, and have not been designed to withstand a 100-year flood (USFS 1995a). The Goat Creek drainage has over 150 miles of road, greater than 4 miles of road per square mile (USFS 2000e).

Goat Creek is a forested watershed. The upper two thirds is dominated by mixed conifer stands of Douglas-fir and subalpine fir. The lower third is dominated by ponderosa pine stands. Because of fire suppression, these stands are becoming more dense, and converting to Douglas-fir. Natural fires in the mixed conifer zone are infrequent, severe, and stand replacing (USFS 1995a).

Goat Creek is a high quality water source for the Methow River. Bull trout, spring chinook salmon, steelhead, rainbow and cutthroat trout use its waters. Steelhead/rainbow trout inhabit Goat Creek and the lower one to two miles of Whiteface Creek, where a road crossing and culvert is a partial or complete barrier to fish passage. Juvenile spring chinook use the lower mile of Goat Creek. Spring chinook may have once spawned in lower Goat Creek, but there is now little suitable spawning habitat there (USFS 1995a).

Based on all the above information, NMFS concludes that not all of the biological requirements of the listed steelhead and spring chinook salmon for freshwater habitat in general are being met under the environmental baseline in this watershed. The status of the species is such that there must be significant improvement in the environmental conditions they experience, over those presently available under the environmental baseline, to meet the biological requirements for survival and recovery of these species. Further degradation of these conditions could significantly reduce the likelihood of survival and recovery of these species due to the amount of risk the listed steelhead and spring chinook salmon already face under the current environmental baseline.

IV. ANALYSIS OF EFFECTS

A. Effects of the Proposed Action

NMFS' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 C.F.R. § 402.02). "Indirect effects" are those that are caused by the proposed action and are later in time, but

still are reasonably certain to occur (*ibid*).

1. Direct Effects

The proposed action (in-channel excavation and rock vane construction) may result in incidental take (death, harassment and displacement) of juvenile steelhead and spring chinook salmon that may range in the project action area. Though neither spawning or the presence of redds has been documented in Goat Creek for either steelhead or spring chinook, juveniles of both species have been observed in the lower stream reach. It is likely that juvenile steelhead and spring chinook migrate up Goat Creek from the Methow River seeking suitable rearing habitat during the spring and early summer when sufficient instream flows are present and permit upstream passage. Thus, it is possible that juvenile steelhead and/or spring chinook rearing in the project action area may be killed, harassed and/or displaced should in-water excavation work be required.

The potential for incidental take to occur would be minimized to a great extent or completely by conducting all construction activities in the dry. The USFWS proposes to conduct the work in late summer and early fall (late August through September) when minimum instream flows prevail, and flow in the lower reach of Goat Creek usually goes subsurface. Should construction work be necessary in the wetted stream channel, flow would first be diverted around the work site. Further, this is a drought year (50% of normal snowpack in the Methow Basin) and it is likely that the lower reach of Goat Creek will go dry sooner this summer than under normal snowpack and flow conditions. Thus, the potential for incidental take through death, harassment, and/or displacement would be greatly reduced.

The USFWS proposes to perform spawning surveys for steelhead in lower Goat Creek during April and May 2001. If steelhead redds are observed, they will be marked. The viability of redds will be determined during low flows, prior to construction. If the redds are desiccated or dewatered, then it would be assumed that they are no longer viable. If the redds are viable they will be protected until the fry have emerged from the gravel.

The project area will also be snorkeled to reduce the possibility of take prior to any channel construction work. Should any adult chinook or steelhead enter the project area after channel work has commenced, then that work will immediately cease until the fish move through the work area.

In-channel excavation and the deposition of quarry rock for vane construction might release an initial pulse of silt. This would occur only if work were conducted in the active (wetted) stream channel, causing a temporary increase in downstream turbidity could occur. In the immediate vicinity of the construction activities (several meters), the level of turbidity would likely exceed the natural background levels and potentially affect fish.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (i.e., gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al*. 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993).

Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35-150 NTU) accelerate foraging rates among juvenile chinook salmon, probably because of reduced vulnerability to predators (camouflaging effect).

Because the USFWS proposes to perform the in-channel construction work in late summer-fall when natural low instream flows occur or the channel would be dry, the potential for death or injury to juvenile salmonids caused by sediment releases/turbidity could be minimized if not avoided entirely. If surface flows are present, a bypass would be constructed to redirect any flow around the work site prior to conducting any instream work. In addition, any sediment releases associated with the work are expected to be short-term in both magnitude and duration.

The excavation of bedload material, the construction of rock vanes, and the installation of large boulders and LWD in the active stream channel and floodplain will disturb existing substrates (fines, gravel and cobble). The direct effect on UCR steelhead and UCR spring chinook will be minor in the short-term and beneficial in the long-term. In-channel excavation work would disturb/disrupt habitat for invertebrate assemblages that provide a food source for juvenile steelhead and spring chinook. That impact is expected to be short-term as recolonization of available habitat would occur from adjacent upstream reach sources. Nevertheless, most, if not all work, will be conducted in the dry, avoiding work while fish are present. Furthermore, rock vane construction, boulder placement and LWD installation should create a series of pools, refugia habitat, and in-channel habitat complexity that presently lacking in the action area. Stream meanders will be established within the active floodplain. Finally, post-project conditions will provide higher quality native cobble and gravel substrates that would be immediately available for fish use.

2. Indirect Effects

Indirect effects of the proposed action probably include sediment introduced into the creek after channel meander construction work is complete. This would likely happen when the following spring season high runoff occurs, before the planted riparian zone and meander channel is established. However, given the existing high sediment loads transported annually from disturbed upstream habitats, it would likely be difficult to detect sediment releases originating from the action area against background levels.

Over the long-term the planted riparian habitat is expected to provide shade, a future source of LWD recruitment, overhanging cover, leaf litter and other detritus for aquatic food chain development in the project area.

Other longer-term indirect effects of channel excavation and meander restoration would include the transport of bedload through the lower alluvial fan of Goat Creek into the Methow River. The reconstructed stream meander channel and instream structures (i.e., excavation of bedload and the installation of vanes, boulders, and LWD) would be designed to promote the transport of smaller rock and fines at high flows through the project area into the Methow River instead of deposition in lower Goat Creek. This is also expected to decrease the channel width/depth ratio and decrease the

possibility and duration of the creek becoming subterranean during the months of August and September.

B. Effects on Critical Habitat

The NMFS designates critical habitat for a listed species based upon physical and biological features that are essential to that species. Essential features of this critical habitat include substrate, water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (65 Fed. Reg. 7764, February 16, 2000). These requirements have been related to pathways and indicators within the MPI.

The direct and indirect effects discussed previously identify that the proposed action would modify critical habitat for both steelhead and spring chinook salmon to a minor extent. The avenues in which critical habitat may be affected are disclosed in the MPI analysis: specifically, in the Water Quality, Habitat Elements, Channel Conditions and Dynamics, and Flow/Hydrology pathways. Within these pathways, most indicators will be improved over the long-term. The exceptions are the temporary effects of turbidity and sediment alteration which may briefly degrade the Water Quality and Habitat Elements MPI indicators. Relating these indicators back to the essential features of critical habitat, the primary impact of the proposed action would be a short-term increase in turbidity and suspended sediments (water quality) and a short-term decrease in food sources.

The NMFS believes the long-term benefits to essential features of critical habitat for both steelhead and spring chinook salmon include improved substrate composition, increased cover/shelter, additional prey sources, additional riparian vegetation, and improved passage
conditions during low flow periods.

C. Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." (50 C.F.R. § 402.2). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Gradual improvements in habitat conditions for salmonids are expected on federal lands as a result of Northwest Forest Plan implementation. Significant improvements in UCR steelhead and UCR spring chinook salmon production outside of U.S. Forest Service and Bureau of Land Management lands is unlikely without changes in forestry, agricultural, and other practices occurring within non-Federal riparian areas. NMFS is aware that significant efforts, such as the Omak Creek Watershed Plan (1995) and the Salmon, Steelhead and Bull Trout Habitat Limiting Factors Report (2000), have been developed to improve conservation and restoration of steelhead and chinook salmon habitat on non-Federal land. Local improvements to currently degraded habitat conditions may occur as a result of water diversion upgrades being planned in the Methow Basin.

NMFS assumes that future private and state actions will continue at similar intensities as in recent years. Now that the UCR steelhead and spring chinook salmon ESUs are listed under the ESA, NMFS assumes that non-Federal landowners in those areas will also take steps to curtail or avoid land management practices that would result in the take of those species. Such actions are prohibited by section 9 of the ESA and subject to the incidental take permitting process under section 10 of the ESA. Future Federal actions, including the on-going operation of hatcheries, harvest, and land management activities, will be reviewed through separate section 7 processes.

V. CONCLUSION

Access to a substantial portion of historical habitat for both steelhead and spring chinook salmon was blocked by the construction of Chief Joseph and Grand Coulee Dams on the mainstem Columbia River. Because of this reduction in access to historical habitat, and because of the relatively pristine habitat conditions in the upper watersheds of the Methow Basin, accessible habitat in the Methow Basin assumes a significance in the survival and recovery of these ESUs disproportionate to the amount of habitat in these watersheds. Consequently, NMFS must closely scrutinize land management actions in the basin that could significantly degrade this important habitat.

The applicant's proposal to restore a meander channel, create habitat complexity, install LWD, improve passage conditions, and plant a riparian zone, for the life of the structures, would provide significant habitat improvements over existing conditions found in the lower one mile reach of Goat Creek. The essential features of critical habitat (i.e., substrate composition, cover/shelter, prey sources, riparian habitat, and passage conditions) for both steelhead and spring chinook salmon is expected to improve over the long-term. Thus, the proposed action will not appreciably reduce the likelihood of survival and recovery of the listed species.

The NMFS concludes that the proposed action will not jeopardize the continued existence of UCR steelhead or UCR spring chinook salmon or result in the destruction or adverse modification of critical habitat within the action area. The determination of no jeopardy or the destruction or adverse modification of critical habitat is based upon the current status of the species, the environmental baseline for the action area, and the effects of the proposed action.

VI. REINITIATION OF CONSULTATION

Consultation must be reinitiated if (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 C.F.R. § 402.16).

VII. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, spawning, rearing, feeding, migrating, and sheltering (50 C.F.R. § 222.106; 64 Fed. Reg. 60727). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

A. Amount or Extent of the Take

The NMFS anticipates that the action covered by this biological opinion may result in incidental take of listed species through direct harm, injury and/or death to juveniles from in-water construction activities. Take may also occur by temporarily displacing listed fish from their habitat should diversion around the work site be necessary. The NMFS does not expect any additional take through indirect impacts of the proposed activities. Any take from the proposed action, would be minimized by the reasonable and prudent measures and terms and conditions. Effects of the action such as these are largely unquantifiable, but are not expected to be measurable as long-term effects on the species' habitat or population levels. The best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the listed species themselves. In instances such as this, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the action covered by this biological opinion.

B. Reasonable and Prudent Measures

The following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take of the listed species. These RPMs are integrated into the BA and proposed project, and NMFS has included them here to provide further detail as to their implementation.

1. Incorporate best management practices (BMPs) to reduce potential impacts of equipment staging, streambank and any instream construction activities.

2. Safely remove listed juvenile fish from the construction area prior to initiating any in-water work.

3. Assure development of functional riparian habitat.

4. Apply appropriate timing restrictions to minimize potential take.

C. Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the U.S. Fish and Wildlife Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. Implement RPM #1 by conducting the following:

    a. Where possible, all in-channel work will be conducted in the dry. If in-water work is necessary, streamflow will be diverted around the work site prior to initiating the work.

    b. A spill prevention, control, and containment plan will be implemented.

    c. Hydraulic fluid in heavy equipment will be replaced with mineral oil or other biodegradable, non-toxic hydraulic fluid.

    d. All heavy equipment will be clean and free of external oil, fuel, or other potential pollutants.

    e. Sediment control devices such as silt fences and straw bales will be used should in-water work be necessary.

2. Implement RPM #2 by conducting the following:

    a. Spring season spawning surveys for UCR steelhead will be conducted in April and May 2001 by qualified fish biologists.

    b. Any steelhead redds observed will be marked. During low flows, prior to project construction, the viability of the redds will be determined. If the redds are viable they will be protected until the fry have emerged. Viable redds shall be protected for three weeks post emergence to ensure that all fry have left.

    c. The project reach will be snorkeled to reduce the possibly of take prior to initiating any construction. Should adult steelhead or spring chinook move into the project area during channel construction activities, then that construction work shall cease until the fish voluntarily pass through the work area.

    d. Any juvenile steelhead or spring chinook salmon observed in the work area will be safely netted, removed from the work area, and safely released back into the stream as soon as possible outside of the work area.

e. In the event that steelhead or spring chinook salmon are killed or injured, the U.S. Fish and Wildlife Service shall immediately report to NMFS, Washington State Habitat Branch, the circumstances under which take occurred and the measures immediately employed to preclude additional take.

3. Implement RPA #3 by conducting the following:

a. All disturbed riparian areas will be planted using native species appropriate for riparian use.

b. Revegetation of the disturbed riparian areas will occur either in fall 2001 immediately after construction is complete or during the following spring, dependant on weather conditions.

c. All plantings will be monitored for at least 5 years to ensure 80% survival; replanting will occur if survival rates are not at less than 80%.

4. Implement RPA #4 by conducting the following:

a. Construction will take place within the time period stipulated by the Washington Department of Fish and Wildlife in their Hydraulic Project Approval.

b. Construction will take from six to eight weeks to complete.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop additional information.

To encourage greater habitat diversity in the constructed floodplain area, NMFS recommends increasing riparian planting to promote future sources of LWD, increased shading, food sources, and substrate stabilization that will further aid in moving the environmental baseline towards a properly functioning condition.

The NMFS must be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or their habitat. Accordingly, NMFS requests notification of the implementation of any conservation recommendations.

IX. ESSENTIAL FISH HABITAT

A. Background

The objective of the Essential Fish Habitat (EFH) consultation is to determine whether the proposed action may adversely affect designated EFH for relevant species, and, if appropriate, to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

B. Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NMFS on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 C.F.R. 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely effect EFH;
- NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH;
- Federal agencies shall within 30 days after receiving conservation recommendations from NMFS provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

C. Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years) (PFMC 1999). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the impacts to these species' EFH from the proposed action is based on this information.

D. Proposed Action

The proposed action and action area are detailed above in Section I. The action area contains habitat that has been designated as EFH for various life stages of chinook and coho salmon.

E. Effects of Proposed Action

As described in detail in Section IV, the proposed activities may result in detrimental short- and long-term impacts to a variety of habitat parameters. These impacts include: silt releases to the stream from in-channel excavation work; removal of bedload and substrate materials to promote cobble and gravel recruitment suitable for salmonid spawning habitat; the temporary loss of invertebrate food sources for juvenile salmonids; and delayed releases of sediment from the replanted riparian zone during the following spring freshet(s).

F. Conclusion

NMFS believes that the proposed action may adversely effect EFH for chinook and coho salmon.

G. EFH Conservation Recommendations

The Reasonable and Prudent Measures and the Terms and Conditions outlined in Section VII are applicable to designated Pacific salmon EFH and address the adverse effects to EFH discussed above. Therefore, NMFS recommends that they be adopted as EFH conservation measures. Should the USFWS adopt and implement these recommendations, potential adverse affects to EFH will be minimized.

H. Statutory Response Requirement

Please note that the Magnuson-Stevens Act and its implementing regulations (50 CFR 600.920(j)) requires the Federal agency to provide a written response to NMFS' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity. In the case of a

response that is inconsistent with the EFH Conservation Recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and measures needed to avoid, minimize, mitigate, or offset such effects.

I. Supplemental Consultation

The USFWS must reinitiate EFH consultation with NMFS if either action is substantially revised or new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.92(k)).

X. REFERENCES

Andonaegui, C. 2000. Salmon, Steelhead and Bull Trout Habitat Limiting Factors. Washington State Conservation Commission Final Report. 7/18/2000.

Barnhart, R.A. 1986. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)-steelhead. U.S. Fish and Wildl. Serv Biol. Rep. 82(11.60), 21 p.

Berg, L., and T.G. Northcote. 1985. Changes in territorial, gill -flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Can. J. Fish. Aquat. Sci. 42:1410-1417.

Bisson, P. A., and R.E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. N. Am. J. Fish. Manage. 4: 371-374.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages83-138 *in* W.R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. Special Publication 19. American Fisheries Society, Bethesda, Maryland.

Botkin, D., K. Cummins., T. Dunne, H. Regier, M. Sobel, and L. Talbot. 1995. Status and future of salmon of western Oregon and northern california; findings and options. Report 38, DRAFT. The Center for the Study of the Environment, Santa Barbara, California.

Brown, L., and P. Moyle. 1991. Eel river survey: Final report. Calif. Dep. Fish Game Contract F-46-R-2, 74 p.+App. (Available from University of California, Davis, Department of Wildlife and Fisheries Biology, Davis, CA 95616).

California Advisory Committee on Salmon and Steelhead (CACSST). 1988. Restoring the balance. Calif. Dep. Fish Game, Sacramento, CA. 84 p.

California State lands Commission (CSLC). 1993. California's rivers, a public trust report, 304p.

Chapman, D., A. Giorgi, T. Hillman, D. Deppert, M. Erho, S. Hays, C. Peven, B. Suzumoto, and R. Klinge. 1994. Status of summer/fall chinook salmon in the mid-Columbia region. Report for Chelan, Douglas, and Grant County PUDs. 412 p. + app. (Available from Don Chapman Consultants, 3653 Rickenbecker, Ste 200, Boise, Idaho 83705.)

Department of the Interior, Fish and Wildlife Service. Biological Assessment for Goat Creek. April 12, 1999.

Gregory, S.V., and P.A. Bisson. 1997. Degradation and loss of anadromous salmonid habitat in the Pacific Northwest. *In* D.J. Stouder, P.A. Bisson, and R.J. Naiman (editors), Pacific salmon and their ecosystems: Status and future options, p. 277-314. Chapman and Hall, New York.

Gregory, R.S., and T.S. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions. Can. J. Fish. Aquat. Sci. 50: 223-240.

Healy, M.C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-394 *in* C. Groot and L. Margolis, editors. Pacific Salmon Life Histories. University of British Columbia Press, Vancouver.

Higgins, P., S. Dobush, and D. Fuller. 1992. Factors in northern California threatening stocks with extinction. Humboldt Chapter of the American Fisheries Society, Arcata, CA, 24p.

McEwan, D., and T.A. Jackson. 1996. Steelhead restoration and management plan for California. California Dep. Fish Game, 234 p. (Available from California Department of Fish and Game, Inland Fisheries Division, 1416 Ninth Street, Sacramento, CA 95814.)

McIntosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wissmar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Historical changes in fish habitat for select river basins of eastern Oregon and Washington. Northwest Science 68:36-53.

Molesworth, J. 2001. Personal communication. USDA Forest Service, Methow Valley Ranger District.

National Marine Fisheries Service (NMFS). 1996a. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Tech. Memo NMFS-NWFSC-27. 261pp.

National Marine Fisheries Service (NMFS). 1996b. Factors for decline: A supplemental to the Notice of determination for West Coast Steelhead under the Endangered Species Act. NMFS Protected Species Branch, Portland, OR, 82 p. + app.

National Marine Fisheries Service (NMFS). 1997. Status Review Update of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Tech Memo NMFS-NWSFSC-

National Marine Fisheries Service (NMFS). 1998a. Status Review of Chinook Salmon from Washington, Idaho. Oregon, California. NOAA Tech Memo NMFS-NWSFSC-35. 443 pp.

National Marine Fisheries Service (NMFS). 1998b. Updated factors for decline: A supplement to Notice of Determination for West Coast Chinook under the Endangered Species Act. NMFS Protected Species Branch, Portland, OR.

NRC (National Research Council). 1996. Upstream: salmon and society in the Pacific Northwest Committee on Protection and Management in the Pacific Northwest Anadromous Salmonids, Board on Environmental Studies and Toxicology, Commission on Life Sciences. 452 pp.

Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: Stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2):4-21.

Omernik, J.M. 1987. Ecoregions of the coterminous United States. Ann. Assoc. Am. Geographers 77:118-125.

Pacific Fishery Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon.

Pauley, G.B., B.M. Bortz, and M.F. Shepard. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest)-steelhead trout. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.62). U.S. Army Corps of Engineers, TR EL-82-4. 24 pp.

Reynolds, F.L., T.J. Mills, R. Benthin, and A. Low. 1993. Restoring central valley streams: A plan for action. Calif. Dep. Fish Game, Sacramento, CA, 184 p.

Rosgen, D.L. 1998. Applied Fluvial Geomorphology Manual. Wildland Hydrology. Pagosa Springs. Colorado.

Servizi, J.A., and D.W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*), p. 254-264. *In* H.D. Smith, L. Margolis, and C.C. Wood [ed.] Sockeye salmon (*Oncorhynchus nerka*) population biology and future management. Can. Spec. Publ. Fish. Aquat. Sci. 96.

Servizi, J.A., and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Can. J. Fish. Aquat. Sci. 49: 1389-1395.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. ManTech Environmental Research Services Corp., Corvallis, OR.

The Federal Interagency Stream Restoration Working Group. 1998. Stream Corridor Restoration: Principles, Processes, and Practices. Washington, D.C.

U.S. Forest Service. 1995a. Goat Creek Watershed Analysis and Interim Late Successional Reserve Assessment. Okanogan National Forest, Methow Valley Ranger District, Winthrop, WA.

U.S. Forest Service. 2000e. Goat Creek Stream Survey Summary, 08 - 92 to 09 - 92. Okanogan National Forest, Methow Valley Ranger District, Winthrop, WA.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Treaty Indian Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory (SASSI). Wash. Dep. Fish Wildlife, Olympia, 212 p. And 5 regional volumes. (Available form Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia, WA 09501-1091.)